

U. S. Appl. No. 10/633,001
Attorney Docket No. 2003B079 US
Reply to Final Office Action of September 28, 2006
Amendment dated January 24, 2007

IN THE CLAIMS:

1. (Currently amended) An elastomeric composition comprising:
 - 1) 20 to 100 phr of an elastomer comprising at least 30 mol% of isobutylene;
 - 2) 80 to 200 phr of carbon black having a surface area of less than 30 m²/g and a dibutylphthalate oil absorption of less than 80 cm³/100 gm; and
 - 3) 2 to 40 phr of polybutene oil having a number average molecular weight greater than 700 [[400]].
2. (Currently amended) The composition of claim 1 where:
 - 1) the elastomer comprises at least 40 mol% of isobutylene; and
 - 2) the carbon black has a surface area of less than 25 m²/g and a dibutylphthalate oil absorption of less than 75 cm³/100 gm; and
 - 3) ~~the polybutene oil has a number average molecular weight greater than 400.~~
3. (Currently amended) The composition of claim 1 where:
 - 1) the elastomer comprises at least 50 mol% of isobutylene;
 - 2) the carbon black has a surface area of less than 25 m²/g and a dibutylphthalate oil absorption of less than 75 cm³/100 gm; and
 - 3) the polybutene oil has a number average molecular weight between 700 [[400]] and 15,000.
4. (Previously presented) The composition of claim 1 where:
 - 1) the elastomer comprises at least 50 mol% of isobutylene;
 - 2) the carbon black has a surface area of less than 25 m²/g and a dibutylphthalate oil absorption of less than 75 cm³/100 gm; and
 - 3) the polybutene oil has a number average molecular weight between 700 and 8,000.
5. (Previously presented) The composition of claim 1 where the polybutene oil is present at 2 to 20 phr.

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6. (Previously presented) The composition of claim 1 where the polybutene oil is present at 2 to 30 phr.
7. (Previously presented) The composition of claim 1, wherein the elastomer is selected from the group consisting of a halogenated poly(isobutylene-co-alkylstyrene), halogenated star-branched butyl rubber, halogenated butyl rubber, butyl rubber, and mixtures thereof.
8. (Previously presented) The composition of claim 1, further comprising a thermoplastic polymer.
9. (Currently amended) The composition of claim 1, wherein the polybutene oil has a number average molecular weight between 700 [[400]] and 10,000.
10. (Previously presented) The composition of claim 1, wherein the polybutene oil is present from 2 to 15 phr.
11. (Previously presented) The composition of claim 1, further comprising one or more filler components selected from the group consisting of calcium carbonate, clay, mica, silica and silicates, talc, titanium dioxide, starch, wood flower, carbon black having a surface area greater than 30 m²/gm, carbon black having a dibutylphthalate oil absorption of more than 80 cm³/100 gm, and carbon black having a surface area of more than 30 m²/g and a dibutylphthalate oil absorption of more than 80 cm³/100 gm.
12. (Previously presented) The composition of claim 1, wherein the composition further comprises an exfoliated clay selected from the group consisting of exfoliated natural or synthetic montmorillonite, nontronite, beidellite, volkonskoite, laponite, hectorite, saponite, saucomite, magadite, kenyaita, stevensite, vermiculite, halloysite, aluminate oxides, hydrotalcite, and mixtures thereof.

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13. (Original) An innerliner for a tire comprising the composition of claim 1.
14. (Original) An innertube for a tire comprising the composition of claim 1.
15. (Original) The composition of claim 1 further comprising one or more carbon blacks having a surface area of greater than 30 m²/g and/or a dibutylphthalate oil absorption of greater than 80 cm³/100 gm.
16. (Original) The composition of claim 1 where the elastomer comprises star branched butyl rubber.
17. (Original) The composition of claim 1 where the elastomer comprises halogenated butyl rubber.
18. (Original) The composition of claim 1 further comprising naphthenic processing oil.
19. (Original) The composition of claim 1 where the polybutene oil comprises a copolymer of butene derived units and one or more olefin derived units having from 3 to 8 carbon atoms.
20. (Original) The composition of claim 1 where the polybutene oil comprises a homopolymer or copolymer of a C₄ raffinate.
21. (Original) The composition of claim 1 where the polybutene oil comprises a homopolymer of isobutylene, or a copolymer of isobutylene and 1-butene or 2-butene, or a terpolymer of isobutylene and 1-butene and 2-butene, wherein the isobutylene derived units are from 40 to 100 wt% of the copolymer, the 1-butene derived units are from 0 to 40 wt% of the copolymer, and the 2-butene derived units are from 0 to 40 wt% of the copolymer.
22. (Original) The composition of claim 1 where the polybutene oil has a viscosity of from 10 to 6000 cSt at 100°C.

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23. (Original) The composition of claim 1 where the polybutene oil has a viscosity of from 35 to 5000 cSt at 100°C.
24. (Original) An air barrier comprising the composition of claim 1.
25. (Original) The composition of claim 1 further comprising an engineering resin selected from the group consisting of polyamides, polycarbonates, polyesters, polysulfones, polylactones, polyacetals, acrylonitrile-butadiene-styrene resins (ABS), polyphenyleneoxide (PPO), polyphenylene sulfide (PPS), styrene-acrylonitrile resins (SAN), polyimides, styrene maleic anhydride (SMA), aromatic polyketones (PEEK, PEK, and PEKK) and mixtures thereof.
26. (Cancelled)
27. (Currently amended) An elastomeric composition comprising:
20 to 100 phr of a random elastomer copolymer comprising poly(isobutylene-co-alkylstyrene);
80 to 200 phr of carbon black having a surface area of less than 30 m²/g and a dibutylphthalate oil absorption of less than 80 cm³/100 gm; and
2 to 40 phr of polybutene oil having a number average molecular weight greater than 700 [[400]].
28. (Original) The composition of claim 27, wherein the poly(isobutylene-co-alkylstyrene) is a halogenated poly(isobutylene-co-p-methylstyrene).
29. (Original) The composition of claim 27, wherein the poly(isobutylene-co-alkylstyrene) is a halogenated poly(isobutylene-co-p-methylstyrene) having a p-bromomethylstyrene content of from 0.1 to 5 wt% based on the weight of the copolymer.

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30. (Previously presented) The composition of claim 27, further comprising a thermoplastic polymer.
31. (Currently amended) The composition of claim 27, wherein the polybutene oil has a number average molecular weight of from 700 [[400]] to than 10,000.
32. (Previously presented) The composition of claim 27, wherein the polybutene oil is present from 2 to 20 phr.
33. (Previously presented) The composition of claim 27, further comprising filler selected from the group consisting of calcium carbonate, clay, mica, silica and silicates, talc, titanium dioxide, starch, wood flower, carbon black having a surface area greater than 30 m²/gm, carbon black having a dibutylphthalate oil absorption of more than 80 cm³/100 gm, and carbon black having a surface area of more than 30 m²/g and a dibutylphthalate oil absorption of more than 80 cm³/100 gm.
34. (Previously presented) The composition of claim 27, whrcin the composition furthr comprises an exfoliated clay selected from the group consisting of exfoliated natural or synthetic montmorillonite, nontronite, beidellite, volkonskoite, laponite, hectorite, saponite, saucouite, magadite, kenyaita, stevensite, vermiculite, halloysite, aluminate oxides, hydrotalcite, and mixtures thereof.
35. (Original) The composition of claim 27 further comprising an engineering resin selected from the group consisting of polyamides, polycarbonates, polyesters, polysulfones, polylactones, polyacetals, acrylonitrile-butadiene-styrene resins (ABS), polyphenyleneoxide (PPO), polyphenylene sulfide (PPS), styrene-acrylonitrile resins (SAN), polyimides, styrene maleic anhydride (SMA), aromatic polyketones (PEEK, PEK, and PEKK) and mixtures thereof.

Claims 36-37. (Cancelled)

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38. (Original) An innerliner for a tire comprising the composition of claim 27.
39. (Original) An innertube for a tire comprising the composition of claim 27.
40. (Original) An air barrier comprising the composition of claim 27.
41. (Previously presented) The composition of claim 27, wherein the polybutene oil has a viscosity of from 10 to 6000 cSt at 100°C.
42. (Previously presented) The composition of claim 27, wherein the polybutene oil is present from 2 to 30 phr.
43. (Original) The composition of claim 1, wherein naphthenic oil is substantially absent.

Claims 44-45. (Cancelled)

46. (Currently amended) An elastomeric composition comprising:
20 to 100 phr of an elastomer comprising at least 40 mol% isobutylene,
80 to 200 phr of carbon black having a surface area of less than 30 m²/g and a dibutylphthalate oil absorption of less than 80 cm³/100 gm;
at least one exfoliated clay, and
2 to 40 phr of polybutene oil having a number average molecular weight greater than 700 [[400]].
47. (Original) The composition of claim 46, wherein the copolymer is selected from a halogenated poly(isobutylene-co-alkylstyrene), halogenated star-branched butyl rubber, halogenated butyl rubber, butyl rubber, and mixtures thereof.

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48. (Previously presented) The composition of claim 46, further comprising a thermoplastic polymer.
49. (Currently amended) The composition of claim 46, wherein the polybutene oil has a number average molecular weight between 700 [(400)] and 10,000.
50. (Previously presented) The composition of claim 46, wherein the polybutene oil is present from 2 to 30 phr.
51. (Previously presented) The composition of claim 46, further comprising filler selected from the group consisting of calcium carbonate, clay, mica, silica and silicates, talc, titanium dioxide, starch, wood flower, carbon black having a surface area greater than 30 m²/gm, carbon black having a dibutylphthalate oil absorption of more than 80 cm³/100 gm, and carbon black having a surface area of more than 30 m²/g and a dibutylphthalate oil absorption of more than 80 cm³/100 gm.
52. (Previously presented) The composition of claim 46, wherein the exfoliated clay is selected from the group consisting of exfoliated natural or synthetic montmorillonite, nontronite, beidellite, volkonskoite, laponite, hectorite, saponite, saucomite, magadite, kenyait, stevensite, vermiculite, halloysite, aluminite oxides, hydrotalcite, and mixtures thereof.
53. (Original) An innerliner for a tire comprising the composition of claim 46.
54. (Original) An innertube for a tire comprising the composition of claim 46.
55. (Previously presented) The composition of claim 46, wherein the polybutene oil has a viscosity of from 10 to 6000 cSt at 100°C.

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56. (Previously presented) The composition of claim 46, wherein the polybutene oil has a viscosity of from 35 to 5000 cSt at 100°C.
57. (Original) The composition of claim 46, wherein naphthenic oil is substantially absent.
58. (Currently amended) An air barrier comprising an elastomeric composition made by the method of:

combining 20 to 100 phr of at least one elastomer comprising at least 40 mol% isobutylene, 80 to 200 phr of carbon black having a surface area of less than 30 m²/g and a dibutylphthalate oil absorption of less than 80 cm³/100 gm; 2 to 40 phr of polybutene oil having a number average molecular weight greater than 700 [[400]], and at least one cure agent; and

curing the combined components to provide the elastomeric composition.
59. (Previously presented) The air barrier of claim 58, wherein the copolymer is selected from the group consisting of a halogenated poly(isobutylene-co-alkylstyrene), halogenated star-branched butyl rubber, halogenated butyl rubber, butyl rubber, and mixtures thereof.
60. (Previously presented) The air barrier of claim 58, further comprising a thermoplastic resin.
61. (Currently amended) The air barrier of claim 58, wherein the polybutene oil has a number average molecular weight of from 700 [[400]] to 10,000.
62. (Previously presented) The air barrier of claim 58, wherein the polybutene oil is present from 2 to 30 phr.
63. (Previously presented) The air barrier of claim 58, further comprising filler selected from the group consisting of calcium carbonate, clay, mica, silica and silicates, talc, titanium dioxide, starch, wood flower, carbon black having a surface area greater than 30 m²/gm, carbon black

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having a dibutylphthalate oil absorption of more than 80 cm³/100 gm, and carbon black having a surface area of more than 30 m²/g and a dibutylphthalate oil absorption of more than 80 cm³/100 gm.

64. (Previously presented) The air barrier of claim 58, wherein the composition further comprises an exfoliated clay selected from the group consisting of exfoliated natural or synthetic montmorillonite, nontronite, beidellite, volkonskoite, laponite, hectorite, saponite, saucinite, magadite, kenyaita, stevensite, vermiculite, halloysite, aluminate oxides, hydrotalcite, and mixtures thereof.

65. (Previously presented) The air barrier of claim 58, wherein the polybutene oil has a viscosity of from 35 to 5000 cSt at 100°C.

66. (Original) The air barrier of claim 58, wherein naphthenic oil is substantially absent.

67. (Original) The air barrier of claim 58, wherein the air permeability of the barrier is from 1.2×10^{-8} to $4 \times 10^{-8} \text{ cm}^3\text{-cm/cm}^2\text{-sec-atm}$ at 65°C.

68. (Previously presented) The air barrier of claim 58, wherein the polybutene oil is a copolymer of isobutylene derived units and 1-butene derived units.

69. (Previously presented) The air barrier of claim 58, further comprising a secondary elastomer selected from the group consisting of natural rubbers, polyisoprene rubber, styrene butadiene rubber (SBR), polybutadiene rubber, isoprene butadiene rubber (IBR), styrene-isoprene-butadiene rubber (SIBR), ethylene-propylene rubber, ethylene-propylene-diene rubber (EPDM), polysulfide, nitrile rubber, propylene oxide polymers, star-branched butyl rubber and halogenated star-branched butyl rubber, brominated butyl rubber, chlorinated butyl rubber, star-branched polyisobutylene rubber, star-branched brominated butyl (polyisobutylene/isoprene copolymer) rubber; isobutylene/alkylstyrene copolymers such as

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isobutylene/meta-bromomethylstyrene, isobutylene/bromomethylstyrene,
isobutylene/chloromethylstyrene, halogenated isobutylene cyclopentadiene, and
isobutylene/chloromethylstyrene and mixtures therof.

70. (Currently amended) A method to prepare an elastomeric composition comprising:
combining:
- 1) 20 to 100 phr of an elastomer comprising at least 30 mol% of isobutylene;
 - 2) 80 to 200 phr of carbon black having a surface area of less than 30 m²/g and a dibutylphthalate oil absorption of less than 80 cm³/100 gm; and
 - 3) 2 to 40 phr of polybutene oil having a number average molecular weight greater than 700 [[400]].
71. (Currently amended) A method to prepare a barrier comprising an elastomeric composition, the method comprising:
- a) combining:
 - 1) 20 to 100 phr of an elastomer comprising at least 30 mol% of isobutylene;
 - 2) 80 to 200 phr of carbon black having a surface area of less than 30 m²/g and a dibutylphthalate oil absorption of less than 80 cm³/100 gm;
 - 3) 2 to 40 phr of polybutene oil having a number average molecular weight greater than 700 [[400]]; and
 - 4) a curing agent, and
 - b) curing the composition.
72. (Currently amended) A method to prepare a barrier comprising an elastomeric composition, the method comprising:
- a) combining:
 - 1) 20 to 100 phr of an elastomer comprising at least 30 mol% of isobutylene;
 - 2) 80 to 200 phr of carbon black having a surface area of less than 30 m²/g and a dibutylphthalate oil absorption of less than 80 cm³/100 gm;

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- 3) 2 to 40 phr of polybutene oil having a number average molecular weight greater than 700 [[400]];
 - 4) optionally, a second elastomer selected from the group consisting of natural rubbers, polyisoprene rubber, styrene butadiene rubber (SBR), polybutadiene rubber, isoprene butadiene rubber (IBR), styrene-isoprene-butadiene rubber (SIBR), ethylene-propylene rubber, ethylene-propylene-diene rubber (EPDM), polysulfide, nitrile rubber, propylene oxide polymers, star-branched butyl rubber and halogenated star-branched butyl rubber, brominated butyl rubber, chlorinated butyl rubber, star-branched polyisobutylene rubber, star-branched brominated butyl (polyisobutylene/isoprene copolymer) rubber; isobutylene/alkylstyrene copolymers such as isobutylene/meta-bromomethylstyrene, isobutylene/bromomethylstyrene, isobutylene/chloromethylstyrene, halogenated isobutylene cyclopentadiene, and isobutylene/chloromethylstyrene and mixtures thereof.
 - 5) filler selected from the group consisting of calcium carbonate, clay, mica, silica and silicates, talc, titanium dioxide, starch, wood flower, carbon black having a surface area greater than 30 m²/gm, carbon black having a dibutylphthalate oil absorption of more than 80 cm³/100 gm, and carbon black having a surface area of more than 30 m²/g and a dibutylphthalate oil absorption of more than 80 cm³/100 gm;
 - 6) optionally, an exfoliated clay selected from the group consisting of exfoliated natural or synthetic montmorillonite, nontronite, beidellite, volkonskoite, laponite, hectorite, saponite, saucnite, magadite, kenyait, stvensite, vermiculite, halloysite, aluminate oxides, hydrotalcite, and mixtures thereof;
 - 7) optionally, a thermoplastic resin; and
 - 8) a curing agent, and
- b) curing the composition.

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73. (Original) The method of claim 72, wherein the copolymer is selected from a halogenated poly(isobutylene-co-alkylstyrene), halogenated star-branched butyl rubber, halogenated butyl rubber, butyl rubber, and mixtures thereof.
74. (Original) The method of claim 72 wherein the thermoplastic polymer comprises an engineering resin.
75. (Original) The composition of claim 1 further comprising paraffinic oil.
76. (Original) An air barrier comprising the composition of claim 46.
77. (Original) The composition of claim 1, wherein paraffinic oil is substantially absent.
78. (Original) The composition of claim 46, wherein paraffinic oil is substantially absent.
79. (Original) The composition of claim 58, wherein paraffinic oil is substantially absent.
80. (Original) The composition of claim 1, wherein naphthenic, aliphatic, paraffinic and other aromatic resins and oils are substantially absent.
81. (Previously presented) The elastomeric composition, air barrier, or method of any one of claims 1, 27, 46, 58, 70, 71, or 72, wherein the carbon black is present at 80 to 140 phr.
82. (Previously presented) The elastomeric composition, air barrier, or method of any one of claims 1, 27, 46, 58, 70, 71, or 72, wherein the carbon black is present at 80 to 160 phr.
83. (Previously presented) The elastomeric composition, air barrier, or method of any one of claims 1, 27, 46, 58, 70, 71, or 72, wherein the carbon black is present at 80 to 180 phr.